WHAT IS CLAIMED IS:

1. A map display device for converting externally provided communications information into an applicable object model for arrangement on a map image, said device comprising:

an input part for receiving a user's instruction;

5   a map data storage part for previously storing map data;

an object model display information storage part for storing object model display information for displaying said object model on said map image;

a communications part for receiving said

10   communications information;

a map data arranging part for creating said object model by interpreting said communications information and the object model display information provided by said object model display information storage part, and arranging the object model on said

15   map; and

a display part for displaying a resultant map image obtained by said map data arranging part.

2. The map display device according to claim 1, wherein said communications information includes time-varying information.

3. The map display device according to claim 2, wherein

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said time-varying information is plurally provided.

4. The map display device according to claim 1, wherein said communications information includes traffic information.

5. The map display device according to claim 1, wherein said communications information includes advertisement information.

6. The map display device according to claim 1, wherein said communications information includes position information corresponding to a predetermined position on said map image.

7. The map display device according to claim 1, wherein said object model display information comprises:

information about shape of said object model; and

information about behavior in time and space of said object model.

8. The map display device according to claim 7, wherein said information about behavior in time and space of said object model is described in an object-oriented interpreter language having no need for compilation.

9. The map display device according to claim 7, wherein

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said information about behavior in time and space of said object model includes an execution condition and an execution function.

10. The map display device according to claim 1, wherein said map data arranging part appropriately arranges said object model on a road image of said map image.

11. The map display device according to claim 10, wherein said object model is plurally created and each appropriately arranged on said road image.

12. The map display device according to claim 1, wherein said map data arranging part comprises:

an object model display information execution part for interpreting and executing said communications information and

5   said object model display information provided by said object model display information storage part;

an object model creation part for creating said object model responsively to a result obtained by said object model display information execution part; and

10   a data arranging part for arranging said object model on said map image.

13. The map display device according to claim 12, wherein

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said map data arranging part further comprises a 3D map generation part for generating a 3D map image based on 2D map data

5   provided by said map data storage part, and

said data arranging part arranges said object model on the map image generated by said 3D map creation part.

14.   The map display device according to claim 12, wherein

said map data arranging part further comprises a 2D/3D coordinate transformation part for transforming a 2D object model

5   created by said object model creation part into a 3D object model, and

said data arranging part arranges the 3D object model transformed by said 2D/3D coordinate transformation part on said map image.

15.   The map display device according to claim 1, further comprising a time information storage part for storing time information corresponding to a position of a mobile unit which moves according to schedule on a predetermined route,

5   wherein

said map data arranging part refers to said time information to create said object model corresponding to said mobile unit for arrangement on said map image.

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16. The map display device according to claim 15., wherein said map data arranging part refers to said time information to select only the object model corresponding to said mobile unit to be displayed on said map image, and calculates a
5   position of the object model on said map image for data arrangement.

17. The map display device according to claim 1, wherein

said communications part receives the communication information including information for specifying a faregate to
5   be passed through, and if necessary, transmits charge information for a charge processing, and

said map data arranging part creates, if necessary, said object model corresponding to said communications information for arrangement on said map image, and generates said
10   charge information.

18. The map display device according to claim 17, wherein said map data arranging part generates said charge information by referring to said communications information related to said faregate placed at an entrance and an exit for
5   a predetermined chargeable section, and creates an object model including a fare for said chargeable section for arrangement on said map image.

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19. The map display device according to claim 17, further comprising a ticket information storage part for storing ticket information corresponding to a ticket used for paying the fare for said chargeable section, wherein

5   said map data arranging part generates said ticket information stored in said ticket information storage part when said ticket is purchased, and if necessary, changes said communications information.

20. The map display device according to claim 19, wherein

        said ticket information includes information about an expiration date of said ticket, and

5   said map data arranging part refers to the information about the expiration date of said ticket, and if necessary, creates a message for display on said display part.

21. The map display device according to claim 1, wherein

        said communications part receives the communications information including position information about any available

5   vehicle, and when the user desires to take one of the available vehicles, transmits selected vehicle information including information for specifying which vehicle the user desires to take, and

said map data arranging part creates said object model

10   corresponding to said communications information for arrangement

on said map image, and when the user desires to take one of the

available vehicles, generates said selected vehicle information.

22. The map display device according to claim 21, wherein said available vehicles are located within a predetermined area range close to a current position of the user.

23. The map display device according to claim 21, wherein said available vehicles move according to schedule on a predetermined route.

24. The map display device according to claim 21, wherein said communications part transmits a request for vehicle information including the current position of the user for an externally provided information center, and receives the

5   communications information including the position information of the available vehicles selected by said information center.

25. The map display device according to claim 21, wherein said map data arranging part refers to said communications information, creates said object model each corresponding to said available vehicle, and if necessary, creates an object model

5   including information about said available vehicles for

arrangement on said map image.

26. A navigation device for converting externally provided communications information into an applicable object model for arrangement on a map image, and making a guidance to a destination, said device comprising:

5   an input part for receiving a user's instruction;

a position detection part for detecting a current position;

a map data storage part for previously storing map data;

an object model display information storage part for

10   storing object model display information in advance for displaying said object model on said map image;

a route selection part for selecting a route to the destination based on said instruction provided by said input part, said current position detected by said position detection part,

15   and said map data stored in said map data storage part;

a communications part for receiving said communications information;

a map data arranging part for creating said object model by interpreting said communications information and the object

20   model display information provided by said object model display information storage part, and arranging the object model on said map;

a guiding part for making the guidance to the

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destination in response to said communications information

25 received by said communications part, said route selected by said route selection part, said current position detected by said position detection part, and said map data provided by said map data storage part, and outputs a resultant map image obtained by said map data arranging part; and

30 a display part for displaying said resultant map image outputted from said guiding part.

27. The navigation device according to claim 26, wherein said object model display information comprises:

information about shape of said object model; and

information about behavior in time and space of said 5 object model.

28. The navigation device according to claim 27, wherein said information about behavior in time and space of said object model is described in an object-oriented interpreter language having no need for compilation.

29. The navigation device according to claim 27, wherein said information about behavior in time and space of said object model includes an execution condition and an execution function.

30. The navigation device according to claim 26, wherein said map data arranging part appropriately arranges said object model on a road image of said map image.

31. The navigation device according to claim 10, wherein said object model is plurally created and each appropriately arranged on said road image.

32. The navigation device according to claim 26, wherein said map data arranging part comprises:

an object model display information execution part for interpreting and executing said communications information and

5 said object model display information inputted from said object model display information storage part;

an object model creation part for creating said object model responsively to a result obtained by said object model display information execution part; and

10 data arranging part for arranging said object model on said map image.

33. The navigation device according to claim 32, wherein

said map data arranging part further comprises a 3D map creation part for generating a 3D map image based on 2D map data

5 provided by said map data storage part, and

said data arranging part arranges said object model on the map image generated by said 3D map creation part.

34.   The navigation device according to claim 32, wherein

said map data arranging part further comprises a 2D/3D coordinate transformation part for transforming a 2D object model created by said object model creation part into a 3D object model, and

said data arranging part arranges the 3d object model transformed by said 2D/3D coordinate transformation part on said map image.

35.   The navigation device according to claim 26, further comprising a time information storage part for storing time information corresponding to a position of a mobile unit which moves according to schedule on a predetermined route, wherein

said map data arranging part refers to said time information to create said object model corresponding to said mobile unit for arrangement on said map image.

36.   The navigation device according to clam 35, wherein said map data arranging part refers to said time information to select only the object model corresponding to said

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mobile unit to be displayed on said map image, and calculates a

5 position of the object model on said map image for data

arrangement.

37. The navigation device according to claim 26, wherein

said communications part receives the communication

information including information for specifying a faregate to

5 be passed through, and if necessary, transmits charge information

for a charge processing, and

said map data arranging part creates, if necessary,

said object model corresponding to said communications

information for arrangement on said map image, and generates said

10 charge information.

38. The navigation device according to claim 37, wherein

said guiding part generates said charge information by

referring to said communications information related to said

5 faregate placed at an entrance and an exit for a predetermined

chargeable section, and

said map data arranging part creates an object model

including a fare for said chargeable section for arrangement on

said map image.

39.   The navigation device according to claim 37, further comprising a ticket information storage part for storing ticket information corresponding to a ticket used for paying the fare for said chargeable section, wherein

5   said guiding part generates said ticket information stored in said ticket information storage part when said ticket is purchased, and if necessary, changes said communications information.

40.   The navigation device according to claim 39, wherein

        said ticket information includes information about an expiration date of said ticket, and

5   said map data arranging part refers to the information about the expiration date of said ticket, and if necessary, creates a message for display on said display part.

41.   The navigation device according to claim 26, wherein

        said communications part receives the communications information including position information about any available vehicle, and when the user desires to take one of the available

5   vehicles, transmits selected vehicle information including information for specifying which vehicle the user desires to take,

        said map data arranging part creates said object model

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corresponding to said communications information for arrangement

10   on said map image, and

said guiding part generates said selected vehicle information when the user desires to take one of the available vehicles.

42.   The navigation device according to claim 26, wherein

said communications part receives the communications information including position information about any available

5   vehicle moving on a predetermined route, and when the user desires to take one of the available vehicles, transmits selected vehicle information including information for specifying which vehicle the user desires to take,

said map data arranging part creates said object model

10   corresponding to said communications information for arrangement on said map image, and

said guiding part generates said selected vehicle information when the user desires to take one of the available vehicles.

43.   The navigation device according to claim 42, wherein said available vehicles are located within a predetermined area range close to a current position of the user.

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44. The navigation device according to claim 44·, wherein said available vehicles move according to schedule on the predetermined route.

45. The navigation device according to claim 44, wherein said guiding part compares, at least, said predetermined route on which said available vehicles move with the route to the destination selected by said route selection part, and determines whether the available vehicles are appropriate.

46. The navigation device according to claim 42, wherein said communications part transmits a request for vehicle information including the current position for an externally provided information center, and receives the communications information including the position information of the available vehicles selected by said information center.

47. The navigation device according to claim 42, wherein said map data arranging part refers to said communications information, creates said object model corresponding to said available vehicle, and if necessary, creates an object model each including information about said available vehicles for arrangement on said map image.

48. A map display method for converting externally

provided communications information into an applicable object

model for arrangement on a map image, said method comprising:

an input step of receiving a user's instruction;

5   a communications step of receiving said communications

information;

a map data arranging step of creating said object model

by interpreting said communications information and

corresponding object model display information for displaying

10   said object model on said map image; and

a display step of displaying a resultant map image

obtained in said map data arranging step.

49.   The map display method according to claim 48,

wherein said map data arranging step comprises:

an object model display information execution step of

interpreting and executing said communications information and

5   said object model display information;

an object model creating step of creating said object

model responsively to a result obtained in said object model

display information execution step; and

a data arranging step of arranging said object model

10   on said map image.

50.   The map display method according to claim 49,

wherein

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said map data arranging step further comprises a 3D map generating step of generating a 3D map image based on said map

5   data being 2D, and

in said data arranging step, said object model is arranged on the map image generated in said 3D map creating step.

51.   The map display method according to claim 49, wherein

said map data arranging step further comprises a 2D/3D coordinates transformation step of transforming a 2D object model

5   created in said object model creating step into a 3D object model, and

in said data arranging step, the 3D object model transformed in said 2D/3D coordinates transformation step is arranged on said map image.

52.   The map display method according to claim 48, wherein, in said map data arranging step, time information corresponding to a position of a mobile unit moving on a predetermined route according to schedule is referred to for

5   creating said object model corresponding to said mobile unit for arrangement on said map image.

53.   The map display method according to claim 48, wherein

in said communications step, the communication information including information for specifying a faregate to be passed through is received, and if necessary, charge information for a charge processing is transmitted, and

in said map data arranging step, if necessary, said object model corresponding to said communications information is created for arrangement on said map image, and said charge information is generated.

54. The map display method according to claim 48, wherein

in said communications step, the communications information including position information about any available vehicle is received, and when the user desires to take one of the available vehicles, selected vehicle information including information for specifying which vehicle the user desires to take is transmitted, and

in said map data arranging step, said object model corresponding to said communications information is created for arrangement on said map image, and when the user desires to take one of the available vehicles, said selected vehicle information is generated.

55. A navigation method for converting externally provided communications information into an applicable object

model for arrangement on a map image, said method comprising:

an input step of receiving a user's instruction;

5   a communications step of receiving said communications information;

a position detection step of detecting a current position;

a map data arranging step of creating said object model

10   by interpreting said communications information and the object model display information provided by said object model display information storage part, and arranging the object model on said map;

a route selection step of selecting a route to the

15   destination based on said instruction inputted in said input step, said current position detected in said position detection step, and said map data;

a guiding step of making the guidance to the destination in response to said communications information received in said

20   communications step, said route selected in said route selection step, said current position detected in said position detection step, and said map data, and outputting a resultant map image obtained in said map data arranging step; and

a display step of displaying said resultant map image

25   outputted in said guiding step.

56. A computer-readable recording medium having a

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program recorded thereon to be executed in a map display device for converting externally provided communications information into an applicable object model for arrangement on a map image,

5   said program comprising:

an object model display information execution step of interpreting and executing said communications information and object model display information for displaying said object model on said map image;

10   an object model creating step of creating said object model responsively to a result obtained in said object model display information execution step; and

a data arranging step of arranging said object model on said map image.

57.   A computer-readable recording medium having a program recorded thereon to be executed in a navigation device for converting externally provided communications information into an applicable object model for arrangement on a map image,

5   said program comprising:

an object model display information execution step of interpreting and executing said communications information and object model display information for displaying said object model on said map image;

10   a route selection step of selecting a route to a destination based on the instruction inputted from the user, a

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current position, and map data; and

a guiding step of making the guidance to the destination in response to said communications information, said route selected in said route selection step, said current position, and said map data, and outputting a resultant map image obtained in said map data arranging step.

58. A computer program to be executed in a map display device for converting externally provided communications information into an applicable object model for arrangement on a map image, said program comprising:

an object model display information execution step of interpreting and executing said communications information and object model display information for displaying said object model on said map image;

an object model creating step of creating said object model responsively to a result obtained in said object model display information execution step; and

a data arranging step of arranging said object model on said map image.

59. A computer program to be executed in a navigation device for converting externally provided communications information into an applicable object model for arrangement on a map image, said program comprising:

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an object model display information execution step of interpreting and executing said communications information and object model display information for displaying said object model on said map image;

5   a route selection step of selecting a route to a destination based on an instruction inputted from a user, a current position, and map data; and

a guiding step of making the guidance to the destination in response to said communications information, said route

10   selected in said route selection step, said current position, and said map data, and outputting a resultant map image obtained in said map data arranging step.